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CLAIMS

1. An hydraulically assisted fastener comprising:

a body with a central bore to engage a connector element and with an annular recess opening outwards to an end surface

5 an annular thrust member which fits into and seals the annular recess

an annular chamber defined by the recess and the thrust member and

a charging medium which is injected into the chamber under pressure and which moves the body relative to the thrust member to tension the connector element and which sets in the chamber to maintain the tension in the connector element.

10 2. The fastener of claim 1 in which the connector element is a bolt or a stud.

3. The fastener of claim 2 in which the body is a nut which screws onto the bolt or stud and the thrust member is a washer with a plain bore.

4. The fastener of claim 1 in which the recess extends inwards to the bore and the chamber is defined by the recess, the thrust member and the connector element.

15 5. The fastener of claim 1 in which the thrust member is a piston ring incorporating an annular flange which extends around and seals the periphery of the body.

6. The fastener of claim 1 in which the body and/or the thrust member incorporate integral deflecting and/or sealing lips which seal the chamber.

20 7. The fastener of claim 1 in which the charging medium is a viscous paste which cures to become solid comprising suspended solids in a self setting compound or particulate solids which behave as fluid media.

8. The fastener of claim 1 in which the charging medium is a solid like graphite which is injected into the chamber by using a medium exchanger.

25 9. The fastener of claim 1 in which the charging medium is a particulate solid of a granular nature such as lead, copper or steel balls.

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10. An hydraulic tensioning device comprising:

a connector body with a plurality of bores which engage connector elements and which have mating recesses opening outwards to an end surface

a plurality of thrust members which seal the recesses

5 a plurality of chambers defined by the recesses and the thrust members

at least one distribution gallery interconnecting the chambers and

a charging medium which is injected under pressure into the chambers via the distribution gallery or galleries and which moves the connector body relative to the thrust members to tension the connector elements and which sets in the chambers

10 to maintain tension in the connector elements.

11. The hydraulic tensioning device of claim 10 in which the bores are inwardly convergent and receive nut cones which lock the connector body to the connector elements.

12. The hydraulic tensioning device of claim 10 in which the recesses extend  
15 inwards to the bores and the chambers are defined by the recesses, the thrust members and the connector elements.

13. The hydraulic tensioning device of claim 10 in which there are additional recesses between adjacent bores.

14. The hydraulic tensioning device of claim 10 in which the connector body and  
20 the thrust members are annular discs adapted for use in the flange joints of pipelines, valves and similar apparatus.

15. The hydraulic tensioning device of claim 10 in which the connector body and the thrust member are square, rectangular, hexagonal, polygonal, circular, elliptical or any other shape.

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